AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Ching-Hsu YANG	Confirmation No: 1902
Appl. No.	:	10/657,132	
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Title	:	THERMAL ENHANCE PACKAGE WITH UNIVERSAL HEAT SPREADER	
TC/A.U.	:	2813	
Examiner	:	James M. Mitchell	
Docket No.:	:	YANG3150/REF	
Customer No:	:	23364	

REQUEST FOR RECONSIDERATION

Mail Stop AF
Commissioner for Patents
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Sir:

This is in response to the Official Action of July 25, 2006, in connection with the above-identified application. This response is timely filed.

The rejection of claims 1, 4-6, 12 and 16 under 35 U.S.C. §103(a) as being unpatentable over Nishiguchi (US Pat. No. 5,525,548) in combination with Williams (US Pat. No. 6,730,998) has been carefully considered but is most respectfully traversed in light of the following comments.

Applicants wish to direct the Examiner's attention to the basic requirements of a prima facie case of obviousness as set forth in the MPEP § 2143. This section states that to establish a prima facie case of obviousness, three basic criteria first must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Section 2143.03 states that all claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Applicants also note MPEP §2143.01, which states in part that, if a proposed modification would render the prior art invention unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

Applicants also most respectfully direct the Examiner's attention to MPEP § 2144.08 (page 2100-114) wherein it is stated that Office personnel should consider all rebuttal argument and evidence presented by applicant and the citation of In re Soni for error in not considering evidence presented in the specification.

The Official Action urges that Nishiguchi discloses in Figures 1, 2 and 10A a thermal enhance semiconductor package comprising, in part, a carrier 1, a semiconductor chip 6 and a universal heat spreader 4, 3 wherein the universal heat spreader is disposed on the back surface of the semiconductor chip. The Official Action also urges that Nishiguchi discloses heat dissipation pins 3 disposed in the through holes of the universal heat spreader 4, 3. Applicants respectfully traverse the assertion that Nishiguchi discloses each of these elements as recited in claim 1 of the instant invention.

Firstly, Applicants traverse the assertion that the elements labeled 3 and 4 in, e.g., Figure 2, comprise a universal heat spreader. The description in Nishiguchi of the structure depicted in Figure 2 states that reference number 3 indicates a heat sink, while reference number 4 indicates a cap. While the heat sink 3 may be reasonably interpreted as a universal hear spreader as recited in the instant claims, Applicants respectfully submit that the cap 4 may not be reasonably interpreted as a heat spreader.

This is seen perhaps most obviously by the fact the Nishiguchi refers to element 3 as a heat sink while referring to element 4 as a cap. That is to say, because Nishiguchi acknowledges the presence of a heat sink by referring to reference numeral 3 as a heat sink, it would naturally follow that Nishiguchi would call element 4 by a similar name if Nishiguchi considered the cap 4 to act as a heat spreader or heat sink. The fact that Nishiguchi refers to element 4 as a cap and not a heat spreader while referring to another element as a heat spreader supports the conclusion that cap 4 is not a heat spreader.

Further, Applicants note that the heat sink 3 of Nishiguchi is designed to take heat away from the semiconductor chip 6 and release it outside of the cap 4. This is explained at, e.g., col. 3, lines 31-34, wherein Nishiguchi explains that "the heat is transmitted from one end to the other end of a heat sink (lower temperature side). By this heat conduction, the heat is conducted outside the cap, and is dissipated outside the cap." Nishiguchi expressly indicates that the heat sink 3 is the sole means for moving heat away from the semiconductor chip and outside of the cap 4. The cap 4 clearly plays no role in heat dissipation.

Applicants also note col. 7, lines 20-24, which states that "since the multi-chip module according to the present embodiment mounts a heat sink only to a semiconductor chip requiring heat dissipation (generating a large amount of heat), the heat dissipation for a multichip module can be performed selectively and efficiently." This portion of the reference indicates that the heat sink is designed specifically to come into contact with the semiconductor chip such that the heat dissipation occurs selectively through only the heat sink 3. The invention disclosed in Nishiguchi is designed specifically such that only the heat sink serves a heat dissipation purpose since selective heat dissipation is an objective of the invention. Thus, by implication, Nishiguchi reveals that the cap 4 is not a heat spreader. If cap were a heat spreader, then Nishiguchi would not achieve selective heat dissipation.

Finally, as evidence that element 4 is not a heat spreader, Applicants note the numerous instances throughout Nishiguchi that indicate the purpose of the cap 4 is to

enclose the semiconductor chip (see, e.g., col. 2, lines 17 and 18). The fact that Nishiguchi expressly provides a function for the cap, and that this function is not to serve as a heat sink, is further evidence that element 4 cannot reasonably be interpreted as a heat sink.

Thus, for all of the forgoing reasons, Applicants respectfully submit that only heat sink 3 may be reasonably interpreted as a universal heat spreader. In light of this, it follows that the heat sink 3 of Nishiguchi fails to read on the universal heat spreader recited in the instant claims.

For example, the Official Action urges the Nishiguchi discloses a heat spreader having through holes. However, the only through holes that are depicted in Figure 2 are through holes located in the cap 4. The heat sink 3 does not have any through holes, but rather, is inserted into the through holes found in cap 4. Therefore, contrary to the assertion made in the Official Action, the heat sink 4 of Nishiguchi fails to comprise through holes and thus does not read on the heat spreader recited in the instant claims.

Furthermore, the Official Action urges that Nishiguchi discloses heat dissipation pins disposed through holes of the universal heat spreader. Based upon this statement, it appears that the Official Action considers the heat sink 3 to read on both the pins recited in claim 1 and the universal heat spreader recited in claim 1. This is clearly an unreasonable interpretation because a heat dissipation pin 3 may not be disposed through itself. The claims of the instant application clearly establish that the universal heat spreader is a separate element from the heat dissipation pins. This can be seen simply by inspecting Figure 3 of the instant application. Figure 3 depicts a universal heat spreader 35 with heat transmission pins 353 inserted in the through holes of the universal heat spreader. Accordingly, the interpretation taken by the Official Action is unreasonable both because a heat transmission pin 3 may not be inserted into itself (i.e., a heat sink 3) and because the instant claims clearly set forth that recited heat transmission pins are separate elements from the recited universal heat spreader.

Accordingly, Applicants respectfully submit that, contrary to the assertion made in the Official Action, Nishiguchi fails to disclose heat transmission pins inserted into the through holes of a heat spreader.

Applicants also respectfully traverse the position taken in the Official Action that Nishiguchi discloses bonding pads. The Official Action urges that the portion of the chip in contact with ball "b" in Figure 10 reads on the claim limitation of bonding pads. Applicants respectfully submit that such an interpretation amounts to ignoring the limitation all together. As may clearly be seen in, e.g., Figure 3 of the instant application, bonding pads 323 that are distinct and separate elements from the semiconductor chip 32 are illustrated. The claims of the instant application recite bonding pads specifically because more than just the surface of the semiconductor chip where the conductive devices contact that semiconductor chip were intended to be part of the claimed invention. The Official Action only points out that the ball "b" in Figure 10 comes into contact with wiring portion 8, but this clearly falls short of disclosing separate and distinct bonding pads as recited in the instant claims. Accordingly, Applicants respectfully submit that Nishiguchi also fails to disclose this element of the claimed invention.

With respect to the above deficiencies of Nishiguchi, Applicants respectfully submit that the secondary references cited in the Official Action do not remedy these deficiencies, and therefore the references fail to disclose or suggest every element of the claimed invention as required for a proper §103(a) rejection according to MPEP §2143.

With respect to the limitation in claim 1 that the universal heat spreader of the thermal enhance semiconductor package comprise both air convection through holes and through holes for heat transmission pins, the Official Action recognizes that Nishiguchi fails to disclose forming through holes in the heat spreader for air convection. To compensate for this deficiency, the Official Action urges that Williams discloses air convection through holes in a heat spreader and argues that it would have been obvious to modify the Nishiguchi invention to include air convection through holes

as taught by Williams to provide added facilitation of cooling. Applicants respectfully traverse this modification of Nishiguchi because Nishiguchi clearly teaches away from such a modification.

Applicants direct attention to, for example, col. 2, lines 3-10 and col. 3, lines 43-45 of Nishiguchi. The first cited portion of Nishiguchi states that the heat sink 3 is inserted into the through hole of the cap 4 such that the cap is hermetically sealed. The second cited portion of Nishiguchi states that an adhesive is filled between the inner wall of the through hole of the cap and the heat sink inserted therein to "shut off passage of air flowing in and out". Since a hermetic seal is an airtight seal, it is clearly evident from these portions of Nishiguchi that the cap 4 is designed to form a seal around the semiconductor chip that does not allow air in or out of the area enclosed by the cap. The Official Action urges that it would be obvious to include air convection through holes in the cap 4 of Nishiguchi as taught by Williams, but such a modification would clearly undermine the hermetic seal that Nishiguchi discloses should be formed by the cap. Accordingly, as Nishiguchi cannot be modified as suggested by the Official Action because such a modification would undermine the invention of Nishiguchi, Applicants respectfully submit that the cited references cannot properly be combined to disclose or suggest this element of the claimed invention.

In light of the above discussion, Applicants respectfully submit that neither Nishiguchi nor Williams, either standing alone or when taken in combination, disclose or suggest every element of claim 1 of the instant application. Accordingly, Applicants respectfully submit that a proper §103(a) rejection of claim 1 has not been established and should therefore be withdrawn.

As claims 4-6, 12 and 16 depend from claim 1 and include all of the limitations of claim 1, it follows that Nishiguchi and Williams also fail to disclose or suggest every element of claims 4-6, 12 and 16 and therefore the §103(a) rejection of these claims over Nishiguchi in view of Williams should also be withdrawn.

The rejection of claims 7-11 under 35 U.S.C. §103(a) as being unpatentable over Nishiguchi in view of Williams as applied to claim 1 and further in combination with

Ootsuki et al. (US Pat. No. 5,652,461), the rejection of claim 15 under 35 U.S.C. §103(a) as being unpatentable over Nishiguchi in view of Williams as applied to claim 1 and further in combination with Akram (US Pub. Pat. App. No. 2002/0185748), and the rejection of claim 17 under 35 U.S.C. §103(a) as being unpatentable over Nishiguchi in view of Williams as applied to claim 1 and further in combination with Chia et al. (US Pat. No. 5,933,710), have each been carefully considered but are most respectfully traversed in light of the following comments.

As indicated in the Official Action, each of the above rejections depends upon as its basis the rejection of claim 1 over Nishiguchi in view of Williams. However, as discussed in detail above, the rejection of claim 1 over Nishiguchi in view of Williams is deficient in several respects. Furthermore, Applicants respectfully submit that none of the secondary references cited above overcome all of these deficiencies. Therefore, as the above rejections depend on a deficient rejection of claim 1, Applicants respectfully submit that each of the subsequent rejections depending on the base rejection of claim 1 is deficient for the same reasons. Accordingly, Applicants respectfully request that each of these rejections be withdrawn.

The rejection of claims 1 and 12-17 under 35 U.S.C. §103(a) as being unpatentable over Tao (US Pat. No. 6,410,981) in combination with Nishiguchi and Xu (US Pub. Pat. App. No. 2003/0143382) has been carefully considered but is most respectfully traversed in light of the following comments.

In summary, the Official Action urges that Tao discloses a thermal enhance semiconductor package generally meeting all of the limitations recited in claim 1 with the exception that Tao does not disclose heat transmission pins inserted into through holes in the universal heat spreader. However, the Official Action urges that based upon the teaching in Nishiguchi and Xu of heat transmission pins inserted in through holes, it would have been obvious to modify Tao to include heat transmission pins in the through holes in order to further increase heat dissipation by increasing surface area. Applicants respectfully traverse this proposed modification, as Tao clearly teaches away from such a modification and none of the cited references disclose the

presence of both through holes for air convection and through holes for inserting heat dissipation pins.

Firstly, with respect to the assertion that Tao may be modified to include heat transmission pins in the through holes, Applicants respectfully submit that such a modification is improper for purposes of a §103 rejection because the modification would render Tao unsatisfactory for its intended purpose. Tao clearly states that vent 10 illustrated in Figure 7 is for allowing moisture to discharge out of the device disclosed in Tao. Therefore, plugging the vents with the pins disclosed in Nishiguchi or fins disclosed in Xu as proposed in the Official Action would clearly render the Tao invention unsatisfactory for its intended purpose, since moisture would not be able to escape out of blocked vents 10. Therefore, the §103(a) rejection set forth in the Official Action fails to satisfy the requirements set forth in MPEP §2143 and should therefore be withdrawn.

Additionally, Applicants note that Nishiguchi discloses inserting heat transmission pins in every through hole of the heat spreader. To the contrary, the presently claimed invention is directed to inserting a heat transmission pin in some of the through holes in the heat spreader, but leaving some of the through holes open for air convection. Paragraph [0029] of Xu fails to disclose inserting heat transmission pins in through holes altogether. Ultimately, since neither of the secondary references suggest inserting heat transmission pins in only some of the through holes of a heat spreader, Applicants respectfully submit that the cited references fail to disclose or suggest the presently claimed invention.

Accordingly, since neither Tao, Nishiguchi nor Xu, either standing alone or when taken in combination, disclose or suggest each and every element of the claimed invention, Applicants respectfully submit that a proper §103(a) rejection according to the guidelines set forth in MPEP §2143 has not been established and the rejection of claims 1 and 12-17 should therefore be withdrawn.

The rejection of claims 4-11 under 35 U.S.C. §103(a) as being unpatentable over Tao, Nishiguchi and Xu as applied to claim 1 and further in combination with Ootsuki

has been carefully considered but is most respectfully traversed in light of the following comments.

As indicated in the Official Action, the above rejection depends upon as its basis the rejection of claim 1 over Tao in view of Nishiguchi and Xu. However, as discussed in detail above, the rejection of claim 1 over Tao in view of Nishiguchi and Xu is deficient. Furthermore, Applicants respectfully submit that the secondary reference cited above does not overcome this deficiency. Therefore, as the above rejection depends on a deficient rejection of claim 1, Applicants respectfully submit that the subsequent rejection depending on the base rejection of claim 1 is deficient for the same reasons. Accordingly, Applicants respectfully request that this rejection be withdrawn.

In view of the above comments, favorable reconsideration and allowance of all of the claims now present in the application are most respectfully requested.

Respectfully submitted,
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Request for Reconsid.wpd

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